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Current position

Scientist, Theoretical Division, Los Alamos National Laboratory

Research interests

Nonlinear dynamics and pattern formation • Complex systems
Dynamics of social and technological networks • Data mining and data analysis
Scientific computing with Python

Employment

2000-2002	Senior Software Engineer, Digital Island/Exodus/Cable & Wireless
1997-	Staff Scientist, Applied Mathematics, Theoretical Division, Los Alamos National Laboratory
1994-1997	Postdoctoral Researcher, Center for Nonlinear Studies, Los Alamos National Laboratory
1991-1992	Graduate Research Assistant, Mathematical Modeling and Analysis, Los Alamos National Laboratory
1990-1991	Research Assistant, University of Arizona

Education

1904	PHD Applied Mathematics, University of Arizona
1991	MS Applied Mathematics, University of Arizona
1989	BA MAGNA CUM LAUDE Mathematics and Physics, St. Olaf College

Honors & awards

1998	Los Alamos Achievement Award for designing and building the Avalon commodity supercomputer
1997	Los Alamos Center for Nonlinear Studies Postdoc Award
1992	DOE Computational Science Graduate Fellowship
1989	Departmental Distinction, Mathematics, St. Olaf College

Service

- 2002-2010 Editorial Board, SIAM Journal of Applied Dynamical Systems
1998- Los Alamos coordinator for DOE Computational Science Graduate Fellowship
1994- Referee for *Physics Letters A*, *Physica D*, *Physical Review*, *Nonlinearity*, *SIAM*

Software

- 2003 NetworkX: A Python package for the creation, manipulation, and study of the structure, dynamics, and functions of complex networks. <http://networkx.lanl.gov/>
2003 PyGraphviz: A Python interface to the Graphviz graph drawing package. <http://networkx.lanl.gov/pygraphviz>

Publications

- 1 Joel C. Miller and Aric Hagberg. Efficient generation of networks with given expected degrees. In *Algorithms and Models for the Web-Graph (WAW 2011)*, pages 115–126, 2011.
2 Golan Bel, Aric Hagberg, and Ehud Meron. Gradual regime shifts in spatially extended ecosystems. in review, 2011.
3 Milan Bradonjić, Aric Hagberg, and Feng Pan. Performance of wireless sensor networks under random node failures. in review, 2011.
4 Milan Bradonjić, Aric Hagberg, Nicolas W. Hengartner, and Allon G. Percus. Analyzing component sizes in general random intersection graphs by eliminating structural dependencies. in review, 2011.
5 Milan Bradonjić, Aric Hagberg, Nicolas W. Hengartner, and Allon G. Percus. Component evolution in general random intersection graphs. In *Algorithms and Models for the Web-Graph (WAW 2010)*, pages 36–49, 2010.
6 Vadas Gintautas, Aric Hagberg, and Luís M. A. Bettencourt. Cooperative searching for stochastic targets. *Journal of Intelligence Community Research and Development.*, 2010.
7 Alexander Gutfraind, Aric Hagberg, and Feng Pan. Interdiction of a Markovian evader. In *Operations Research, Computing, and Homeland Defense*, INFORMS Hannover, MD, 2010.
8 Yair Mau, Aric Hagberg, and Ehud Meron. Dual-mode spiral vortices. *Phys. Rev E.*, 80:065203(R), 2009.
9 Johan Bollen, Herbert Van de Sompel, Aric Hagberg, and Ryan Chute. A principal component analysis of 39 scientific impact measures. *PLoS ONE*, 4:e6022, 2009.
10 Vadas Gintautas, Aric Hagberg, and Luis M. A. Bettencourt. When is social computation better than the sum of its parts? In *Social Computing and Behavioral Modeling*, pages 93–101, New York, NY USA, 2009.
11 Johan Bollen, Herbert Van de Sompel, Aric Hagberg, Luis Bettencourt, Ryan Chute, Marko A. Rodriguez, and Lyudmila Balakireva. Clickstream data yields high-resolution maps of science. *PLoS ONE*, 4:e4803, 2009.
12 Alexander Gutfraind, Aric Hagberg, and Feng Pan. Optimal interdiction of unreactive Markovian evaders. In *Integration of AI and OR Techniques in Constraint Programming for Combinatorial Optimization Problems*, Springer Berlin / Heidelberg, 2009.
13 Rotem Manor, Aric Hagberg, and Ehud Meron. Wavenumber locking and pattern formation in spatially forced systems. *New J. Phys.*, 1:063016 (19pp), 2009.
14 Aric A. Hagberg, Daniel A. Schult, and Pieter J. Swart. Exploring network structure, dynamics, and function using NetworkX. In *Proceedings of the 7th Python in Science Conference (SciPy2008)*, pages 11–15, Pasadena, CA USA, August 2008.
15 Aric Hagberg and Daniel A. Schult. Rewiring networks for synchronization. *Chaos*, 18:037105, 2008.
16 Milan Bradonjić, Aric Hagberg, and Allon G. Percus. The structure of geographical threshold graphs. *Internet Math.*, 5:113–140, 2008.
17 Rotem Manor, Aric Hagberg, and Ehud Meron. Wave-number locking in spatially forced pattern-forming systems. *EPL*, 83:10005, 2008.

- 18 Luís M. A. Bettencourt, Aric A. Hagberg, and Levi B. Larkey. Separating the wheat from the chaff: Practical anomaly detection schemes in ecological applications of distributed sensor networks. In *Distributed Computing in Sensor Systems (DCOSS 2007)*, pages 223–239, Santa Fe, NM USA, June 2007.
- 19 Milan Bradonjić, Aric Hagberg, and Allon G. Percus. Giant component and connectivity in geographical threshold graphs. In *Algorithms and Models for the Web-Graph (WAW 2007)*, pages 209–216, San Diego, CA USA, 2007.
- 20 Bradley Marts, David J. W. Simpson, Aric Hagberg, and Anna L. Lin. Period doubling in a periodically forced Belousov-Zhabotinsky reaction. *Phys. Rev. E*, 76:026213, 2007.
- 21 Aric Hagberg, Pieter J. Swart, and Daniel A. Schult. Designing threshold networks with given structural and dynamical properties. *Phys. Rev. E*, 74:056116, 2006.
- 22 Bradley Marts, Aric Hagberg, Ehud Meron, and Anna L. Lin. Resonant and non-resonant patterns in forced oscillators. *Chaos*, 16:037113, 2006.
- 23 Scott L. Collins, Luís M. A. Bettencourt, Aric Hagberg, Renee F. Brown, D. I. Moore, Greg Bonito, Kevin A. Delin, Shannon P. Jackson, David W. Johnson, Scott C. Burleigh, Richard R. Woodrow, and J. Michael McAuley. New opportunities in ecological sensing using wireless sensor networks. *Frontiers in Ecology*, 4:402–407, 2006.
- 24 A. Hagberg, A. Yochelis, H. Yizhaq, C. Elphick, L. Pismen, and E Meron. Linear and nonlinear front instabilities in bistable systems. *Physica D*, 217:186–192, 2006.
- 25 Aric Hagberg, Bradley Marts, Anna L. Lin, and Ehud Meron. Bloch-front turbulence: Theory and experiments. *Physica A*, 356:88–94, 2005.
- 26 Arik Yochelis, Christian Elphick, Aric Hagberg, and Ehud Meron. Frequency locking in extended systems: the impact of a Turing mode. *Europhys. Lett.*, 69:170–176, 2005.
- 27 Bradley Marts, Aric Hagberg, Ehud Meron, and Anna L. Lin. Bloch-front turbulence in a periodically forced Belousov-Zhabotinsky reaction. *Phys. Rev. Lett.*, 93:108305, 2004.
- 28 Arik Yochelis, Christian Elphick, Aric Hagberg, and Ehud Meron. Two-phase resonant patterns in forced oscillatory systems. *Physica D*, 199:201–222, 2004.
- 29 Anna L. Lin, Aric Hagberg, Ehud Meron, and Harry L. Swinney. Resonance tongues and patterns in periodically forced reaction-diffusion systems. *Phys. Rev. E*, 69:066217, 2004.
- 30 Aric Hagberg and Ehud Meron. Vortex-pair dynamics in anisotropic bistable media: a kinematic approach. *Phys. Rev. Lett.*, 91:224503, 2003.
- 31 A. Yochelis, A. Hagberg, E. Meron, A. L. Lin, and H. L. Swinney. Development of standing-wave labyrinthine patterns. *SIADS*, 1(2):236–247, 2002.
- 32 Ehud Meron, Markus Bär, Aric Hagberg, and Uwe Thiele. Front dynamics in catalytic surface reactions. *Catalysis Today*, 70(4):331–340, 2001.
- 33 Aric Hagberg and Ehud Meron. Spiral wave nucleation. In *Interfaces, Pulses and Waves in Nonlinear Dissipative Systems. RIMS Project 2000: Reaction-diffusion systems: theory and application*. Takao Ohta, ed., pages 66–71, RIMS, Kyoto, 2001.
- 34 A. L. Lin, A. Hagberg, A. Ardelean, M. Bertram, H. L. Swinney, and E. Meron. Four-phase patterns in forced oscillatory systems. *Phys. Rev. E*, 62:3790–3798, 2000.
- 35 Markus Bär, Aric Hagberg, Ehud Meron, and Uwe Thiele. Front propagation and pattern formation in anisotropic media. *Phys. Rev. E*, 62(1):366–374, 2000.
- 36 Aric Hagberg, Ehud Meron, and Thierry Passot. Phase dynamics of nearly stationary patterns in activator-inhibitor systems. *Phys. Rev. E*, 61(6):6471–6476, 2000.
- 37 Christian Elphick, Aric Hagberg, and Ehud Meron. Phase front solutions and instabilities in forced oscillations. In *Equadiff 99 : Proceedings of the International Conference on Differential Equations Berlin, Germany 12 August 1999*, 2000.
- 38 Markus Bär, Aric Hagberg, Ehud Meron, and Uwe Thiele. Stratified spatiotemporal chaos in anisotropic reaction-diffusion systems. *Phys. Rev. Lett.*, 83:2664–2667, 1999.
- 39 Michael S. Warren, Aric Hagberg, J. David Moulton, David Neal, and John K. Salmon. Avalon: champagne computing on a beer budget. Extended abstract, 1999.
- 40 Christian Elphick, Aric Hagberg, and Ehud Meron. Multiphase patterns in periodically forced oscillatory systems. *Phys. Rev. E*, 59(5):5285–5291, 1999.
- 41 Aric Hagberg and Ehud Meron. Order parameter equations for front transitions: nonuniformly curved fronts. *Physica D*, 123:460, 1998.

- 42 Aric Hagberg and Ehud Meron. Propagation failure in excitable media. *Phys. Rev. E*, 57:299, 1998.
- 43 C. Elphick, A. Hagberg, and E. Meron. A phase front instability in periodically forced oscillatory systems. *Phys. Rev. Lett.*, 80(22):5007–5010, 1998.
- 44 Aric Hagberg and Ehud Meron. Kinematic equations for front motion and spiral-wave nucleation. *Physica A*, 249:118, 1998.
- 45 C. Elphick, A. Hagberg, E. Meron, and B. Malomed. On the origin of traveling pulses in bistable systems. *Phys. Lett. A*, 230:33–37, 1997.
- 46 A. Hagberg, E. Meron, I. Rubinstein, and B. Zaltzman. Order parameter equations for front transitions: planar and circular fronts. *Phys. Rev. E*, 55(4):4450–4457, 1997.
- 47 Aric Hagberg and Ehud Meron. The dynamics of curved fronts: beyond geometry. *Phys. Rev. Lett.*, 78(6):1166–1169, 1997.
- 48 A. Hagberg, E. Meron, I. Rubinstein, and B. Zaltzman. Controlling domain patterns far from equilibrium. *Phys. Rev. Lett.*, 76:427–430, 1996.
- 49 Aric Hagberg and Ehud Meron. A mechanism for spatio-temporal disorder in bistable reaction-diffusion systems. *Nonlinear Science Today*, 1996.
- 50 Aric Hagberg and Ehud Meron. Oscillating reaction-diffusion spots. Technical report, Center for Non-linear Studies, Los Alamos National Laboratory, 1996.
- 51 D. Haim, G. Li, Q. Ouyang, W. D. McCormick, H. L. Swinney, A. Hagberg, and E. Meron. Breathing spots in a reaction-diffusion system. *Phys. Rev. Lett.*, 77(1):190–193, 1996.
- 52 C. Elphick, A. Hagberg, and E. Meron. Dynamic front transitions and spiral-vortex nucleation. *Phys. Rev. E*, 51(4):3052–3058, 1995.
- 53 Aric Hagberg and Ehud Meron. From labyrinthine patterns to spiral turbulence. *Phys. Rev. Lett.*, 72(15):2494–2497, 1994.
- 54 A. Hagberg and E. Meron. Pattern formation in non-gradient reaction-diffusion systems: the effects of front bifurcations. *Nonlinearity*, 7:805–835, 1994.
- 55 A. Hagberg and E. Meron. Complex patterns in reaction-diffusion systems: a tale of two front instabilities. *Chaos*, 4(3):477–484, 1994.
- 56 Aric Hagberg. *Fronts and patterns in reaction-diffusion equations*. PhD thesis, University of Arizona, 1994.
- 57 Aric Hagberg and Ehud Meron. Domain walls in nonequilibrium systems and the emergence of persistent patterns. *Phys. Rev. E*, 48:705–708, 1993.
- 58 Yu. A. Rzhanov, H. Richardson, A. A. Hagberg, and J. V. Moloney. Spatio-temporal oscillations in a semiconductor etalon. *Phys. Rev. A*, 47(2):1480–1491, 1993.

Presentations

June 2010	Sunbelt Social Networks Conference, Riva del Garda, Italy
May 2010	DOE ASCR PI Meeting Plenary, Berkeley, CA
October 2009	DTRA Basic Research Review, Washington, DC
July 2009	SIAM Annual Meeting, Denver CO
May 2009	SIAM Applications of Dynamical Systems, Snowbird, UT
March 2009	SIAM Conference on Computational Science and Engineering, Miami, FL
August 2008	Python in Science Conference (SciPy2008), Pasadena, CA
December 2007	Japanese-American Frontiers of Science Workshop, Kanagawa Japan
May 2007	SIAM Conference on Applications of Dynamical Systems, Snowbird, UT
January 2007	DIMACS-Georgia Tech Workshop on Complex Networks and their Applications, Atlanta, GA
March 2006	Challenges in Distributed Sensor Networks, Los Alamos National Laboratory, Los Alamos NM
June 2005	Gordon Research Conference on Nonlinear Science, Colby College Waterville, ME
May 2005	SIAM Conference on Applications of Dynamical Systems, Snowbird, UT
December 2004	XIV Conference on Nonequilibrium Statistical Mechanics and Nonlinear Physics, La Serena, Chile
September 2004	SciPy04, California Institute of Technology, Pasadena, CA
December 2003	Center for Nonlinear Studies Colloquim, Los Alamos, NM
May 2001	SIAM Conference on Applications of Dynamical Systems, Snowbird, UT

October 1999 Center for Nonlinear Dynamics Seminar, University of Texas at Austin
May 1999 SIAM Conference on Applications of Dynamical Systems, Snowbird, UT
May 1997 Nonlinear Waves and Solitons in Physical Systems, CNLS Annual Meeting, Los Alamos, NM
January 1997 Arizona Days, Program in Applied Mathematics, University of Arizona, Tucson AZ
April 1997 Instituto Nazionale di Ottica, Florence, Italy
March 1996 Max-Planck-Institute for Complex Systems Physics, Dresden, Germany
March 1996 Fritz-Haber-Institute, Berlin, Germany
February 1996 Workshop on Domain Walls Near and Far from Equilibrium, Sede Boker, Israel
November 1995 Department of Chemical Engineering, Princeton University
November 1995 Institute for Nonlinear Science, University of California, San Diego, CA
October 1995 Applied Math Colloquium, University of New Mexico, Albuquerque, NM
October 1995 Santa Fe Institute, Santa Fe, NM
September 1995 Center for Nonlinear Studies Seminar, Los Alamos, NM
March 1995 Applied Math Department, University of Colorado, Boulder, CO
February 1994 Arizona Days, Center For Nonlinear Studies, Los Alamos, NM
August 1993 Computational Science Graduate Fellowship Conference, Minneapolis, MN
February 1992 Arizona Days, Center For Nonlinear Studies, Los Alamos, NM